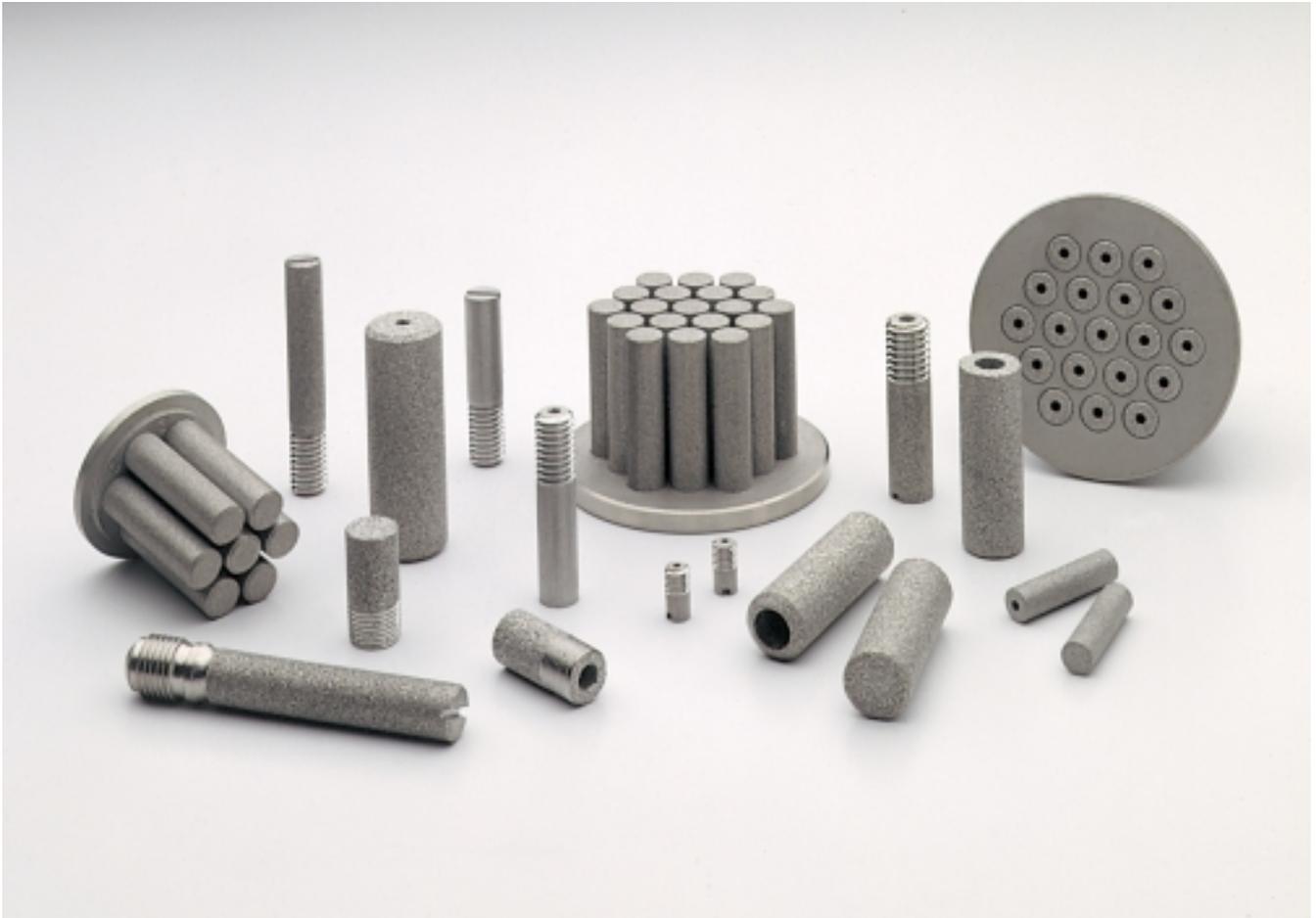


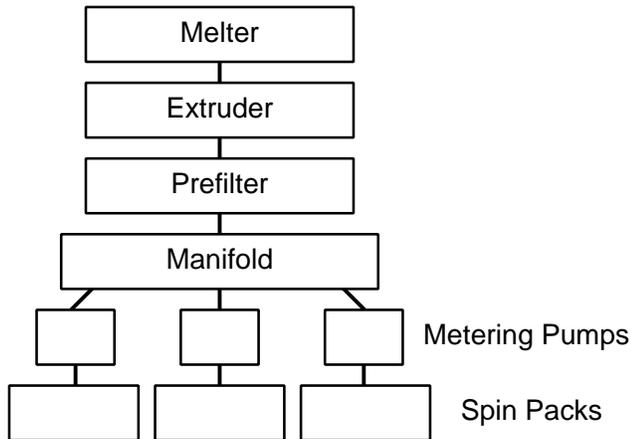
# Mott Melt Polymer Spin Pack Filters Engineering and Product Guide



# Synthetic Fiber Production

## Melt Spinning Production Arrangement

The typical set-up for synthetic fiber melt spinning production consists of a polymer melter, an extruder, a prefilter (such as a screen changer), a central manifold, metering pumps, and spin packs (where the individual fiber strands are produced).



The prefilter (screen changer) removes the relatively large particles, but additional filtration is needed in the spin packs to protect the spinnerette and ensure fiber quality, i.e., no breaks.

## History of Spinnerette Pack Filtration

Combinations of sand and screens have been used for many years. Screen packs made up of coarse and fine-woven screen wire cloth are inserted into the cavity of a spin pack body and support layers of graduated silica sand or similar granular media. The filtration is accomplished by the alternating velocity of the polymer as it passes through the intricate pore structure formed by the media contact points. The screens are primarily for support; however, they can be structured to provide a degree of shear to the fluid stream.

This pack filter arrangement is relatively inexpensive, but has several disadvantages. The sand or other loose media is somewhat unstable and can allow “channeling,” where polymer can bypass the filter, resulting in fiber breaks and shortened pack life. There may also be intermixing of sand particles at the interface of various layers of sand, resulting in a higher than normal pressure drop.

## Mott in Pack Filtration

In the early 1960's, Mott Corporation developed sintered powdered metal filter disc inserts that, in some cases, replaced the sand pack for filtration. The sintered structure eliminated the problem of channeling and provided more reliability. The sintered powdered metal disc also replaced the more expensive screen packs.

Shortly thereafter, Mott developed the Extended Area Pack (EAP) filter, consisting of closely packed porous filter cups arranged in a base plate that is inserted into the spin pack body. These packs are extensively used for filtration of Nylon 6 fibers. They allow extended pack life and eliminate channeling.

# Synthetic Fiber Production (cont'd.)

## Mott Polymer Grades

During the development of the shear disc inserts and the extended area packs, Mott originally produced porous material in media grades of 10, 20, 40 and 100. It was discovered that these increments were too broad to meet the filtration and shear requirements of the range of polymers produced. In response Mott developed 10 polymer grades from 10 to 100 micron. Following are nominal filtration equivalents of the grades.

PG1	10 micron
PG2	12 micron
PG3	15 micron
PG4	20 micron
PG5	30 micron
PG6	40 micron
PG7	55 micron
PG8	60 micron
PG9	80 micron
PG10	100 micron

## New Developments

For gel prone polymers – metal powders, or “shattered metal” has come into use replacing sand. A combination of a Mott EAP with shattered metal filling the space between the filter cups and just above the cups results in gel removal, longer pack life and improves overall filter performance. This loose media prevents Mott's media from being “face blinded”.

## Pack Life and Reuse

Several factors influence pack life, such as the pigment loading in the polymer, the quality of the pigment (dispersion and agglomerates), and polymer (gels content). Pack life can vary from a few days to weeks to months depending upon the application.

Pack filters are generally removed when the differential pressure reaches a predetermined value. Mott EAP filters can be cleaned and reused many times, making them cost-effective process components.

## Cleaning Extended Area Packs

The first step in cleaning EAPs is to remove the solidified polymer from the pack. The most effective way to do this is with a controlled atmosphere fluid bed cleaner. A second method is an oven burn-out at 850-900°F, which will contribute oxidation of the porous media, which can shorten the useful life of the EAP. After the polymer is degraded, a flush in 20% caustic at 200-212°F is done, then a water rinse, then immersion in an ultrasonic bath in a detergent solution for up to two hours. In some cases it may be desirable to soak in a 15% nitric acid solution at 130°F for up to one hour, followed by a water and steam flushing, and oven drying.

# Mott Polymer Grade Filter Cups

## Precise Porosity Control

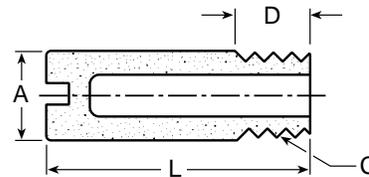
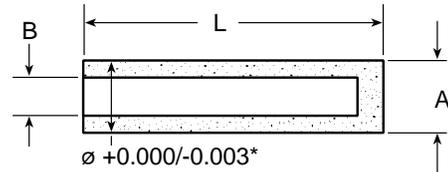
Mott precision means exceptional filtration control for minimum yarn breaks. Proprietary manufacturing processes assure precise filtration and repeatable performance.

**Straight Filter Cups** – for press fit into base plates or Mott Extended Area pack filters.

## Ordering Information Straight Filter Cups

Catalog Number	Computer Part No. (CPN)	A Diameter Ref	B I.D. Ref	L Ref
1200-.200-.065-1.375-PG3	1221300-01-PG3	0.201"	0.065"	1.375"
-PG4	-PG4			
1200-.252-.080-1.000-PG4	1221600-01-PG4	0.252"	0.080"	1.000"
1200-.317-.093-1.000-PG1	1222400-01-PG1	0.317"	0.093"	1.000"
-PG4	-PG4			
1200-.317-.093-1.423-PG2	1222680-01-PG2	0.317"	0.093"	1.423"
-PG3	-PG3			
1200-.317-.093-1.463-XXX	1222700-01-XXX	0.317"	0.093"	1.463"
-2.000-	1222900-01-XXX			2.000"
-2.375-	1223000-01-XXX			2.375"
1200-.380-.156-1.000-XXX	1223500-01-XXX	0.380"	0.156"	1.000"
-1.500-	1224050-01-XXX			1.500"
-2.000-	1224400-01-XXX			2.000"

Other lengths and diameters available, consult factory.  
 -XXX Specify polymer grade PG1, PG2, PG3, PG4, PG5, PG6, PG7, PG8, PG9, PG10. Consult factory for availability.



## Threaded and Slotted Filter Cups

Catalog Number	Computer Part No. (CPN)	A Diameter	L	C Threaded	D (+0.000/-0.050")
1240-.250-1.000-XXX	1242185-01-XXX	0.250"	1.000"	1/4-20-UNC-1A	0.300"
1240-.317-1.463-XXX	1242452-01-XXX	0.317"	1.463"	5/16-18-UNC-1A	0.490"
-2.000-	1242455-01-XXX		2.000"		
1240-.380-1.500-XXX	1243070-01-XXX	0.380"	1.500"	3/8-16-UNC-1A	0.490"
-2.000-	1243210-01-XXX		2.000"		

Other lengths and diameters are available, consult factory.  
 -XXX Specify polymer grade PG3, PG4, PG5, PG6, PG7, PG8, PG9, PG10.

\*For 1/4" minimum length on open end.

# Mott Extended Area Packs

## Extended Area for Longer Pack Life

Mott Extended Area Pack filters have been used in the field since 1966. Mott EAPs have replaced sand packs (see bottom illustration) and screen packs, with area multiplications from 3 to 10 times. Mott high-precision porous 316L stainless steel filter cups ensure continuous filtration performance (without channeling which occurs in sand packs), and eliminate the fragile nature of screen packs under pressure.

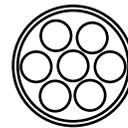
## Construction

Mott porous cups are closely packed in a base plate. The cups are press-fitted or threaded and sinter-bonded in place to ensure mechanical integrity. The EAP assembly is inserted into the spin pack body and sealed in place using a crush ring or a Mott Expandable Seal.

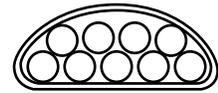
Extended Area Packs can be circular, kidney shaped, rectangular, or obround to match the shape of the spinnerette pack.

## Start-up Pressure and Shear

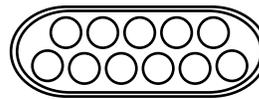
With the introduction of an EAP in a spin pack, the start-up pressure and shear are significantly reduced due to increase in filter area which results in lower polymer flow velocity through the EAP. To achieve the proper start-up pressure and shear, and to break the lateral molecular bonds and retain the longitudinal molecular bonds in the polymer fiber, Mott provides shear compensating discs downstream of the EAP. This assures continuous fiber quality without breaks. The shear disc is a coarser grade than the EAP filter, which prevents blinding.



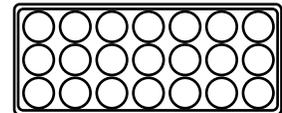
CIRCULAR PACK



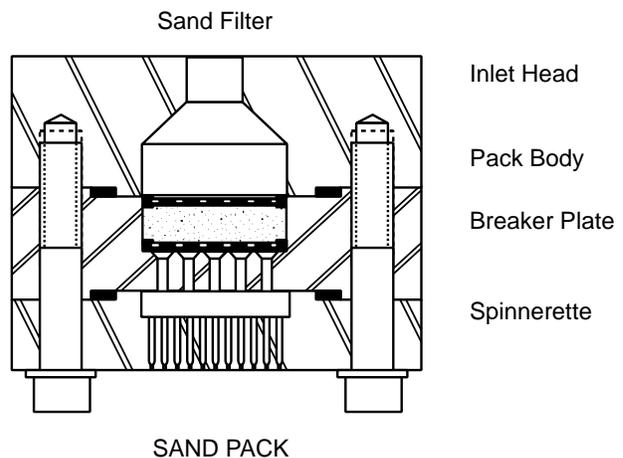
KIDNEY PACK



OBROUND PACK



RECTANGULAR PACK

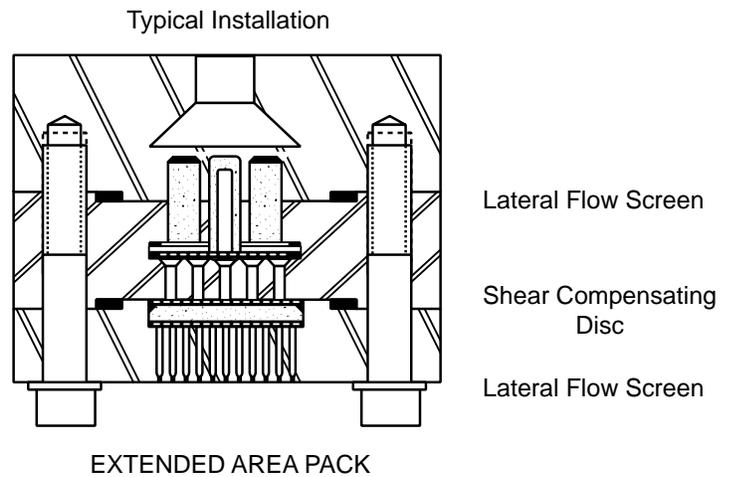


# Mott Extended Area Packs

## Configurations

The Extended Area Pack is typically mounted on a breaker plate in the spin pack. To assure uniform polymer flow from the EAP, a lateral flow or drainage screen is located between the EAP and breaker plate. The shear compensating disc is usually located between the breaker plate and the spinnerette, with lateral flow screens to assure uniform polymer flow distribution.

There are various other pack configurations that can be adapted to the Mott Extended Area Pack technology.



## Ordering Information

Nominal Diameter	Computer Part No. (CPN)	Cup Diameter	No. of Cups	H	Effective Area	Seal*
35 mm (1.378")	4810230-XXX	0.317"	7	1.463"	10.0 in. <sup>2</sup>	10268
52 mm (2.038")	4810309-XXX	0.317"	19	2.000"	32.2 in. <sup>2</sup>	C/R
59.7mm (2.353")	4810140-XXX	0.317"	19	1.463"	25.5 in. <sup>2</sup>	10273
65.8 mm (2.590")	4810186-XXX	0.380"	19	2.250"	47.5 in. <sup>2</sup>	10212
152 mm (5.968")	4810130-XXX	0.490"	73	1.750"	172.0 in. <sup>2</sup>	10404

Other heights (H) and diameters available, consult factory.

-XXX Specify polymer grade PG1, PG2, PG3, PG4, PG5, PG6, PG7, PG8, PG9, PG10.

\*Seal: Number designates Mott Expandable Seal. C/R designates a Crush Ring Seal.